Notice of Allowability	Application No.	Applicant(s)	
	10/044,112	UNGAR, DAVID M.	
	Examiner	Art Unit	
	Tuan A. Vu	2193	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *5/25/05*.

2. ☒ The allowed claim(s) is/are *1,2 and 4-21(now renumbered 1-20)*.

3. ☒ The drawings filed on *04 June 2002* are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date *20050818* .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

1. This action is responsive to the Applicant's response filed 5/25/2005.

As indicated in Applicant's response, no claims have been amended. Claims 1-21 are pending in the office action.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Steven Gillian, reg. # 51734 on 8/17-8/18, 2005.

The application has been amended as follows:

In the Claims,

Claim 1:

A method of selecting certain portions of a computer program for compilation, the method comprising:

computing ~~a compilation threshold corresponding to~~ an execution frequency threshold at which a decreasing hazard rate corresponds to a reciprocal of a break-even number of executions that recoup computational costs of compilation; and

during execution of the computer program, dynamically compiling individual ones of the portions based on ~~correspondence between observed execution for the individual portions and~~ the ~~compilation~~ execution frequency threshold~~.~~,

wherein the hazard rate, *hr(x)*, for a particular one of the computer program portions at least approximates a probability that the particular portion will stop being executed in the computer program given that the particular program has executed *x* times.

Claim 3: (canceled)

Claim 11:

An computer-implemented execution environment for a computer program ~~encoded using~~ including execution codes that may optionally be executed in either a first or a second form thereof, the execution environment comprising:

a dynamic compilation mechanism that transforms an implementation of a particular one of the execution code in a first form to the second form thereof, wherein the second form is substantially optimized as compared to the first form; and

~~for at least the particular execution code,~~ a transformation threshold computation mechanism that computes, at least for the particular execution code, an ~~execution-time measurement of~~ execution frequency threshold at which a decreasing hazard rate corresponds to a reciprocal of a break-even number of executions that recoup computational costs of transformation to the second form,

wherein the dynamic compilation mechanism is responsive to the computed execution frequency threshold ~~execution-time measurement.~~;

wherein the hazard rate, *hr(x)*, for a particular one of the computer program portions at least approximates a probability that the particular portion will stop being executed in the computer program given that the particular program has executed *x* times.

Claim 15:

A computer program product encoded in at least one computer readable medium, the computer program product comprising:

first instructions executable on a processor to instrument execution of a computer program executing thereon, the first instructions providing data indicative of execution frequency for at least a particular portion of the computer program; and

second instructions executable to identify a particular ~~point~~ execution frequency threshold in the execution of the computer program at which a decreasing hazard rate calculated from the execution frequency data for the particular portion of the computer program corresponds to a reciprocal of a break-even number of executions thereof that recoup computational costs of transformation to an optimized form.

wherein the hazard rate, *hr(x)*, for a particular one of the computer program portions at least approximates a probability that the particular portion will stop being executed in the computer program given that the particular program has executed *x* times,

wherein the execution frequency threshold identified by the second instructions for a particular portion of the computer program indicates an opportunity to dynamically compile the particular portion of the computer program.

Claim 21:

An apparatus comprising:

~~means for dynamically transforming an implementation of a particular execution code to an optimized form thereof; and~~

means which is encoded in at least one computer-readable media, for measuring execution frequency for at least ~~the~~ a particular execution code and, based thereon, determining ~~a~~

~~point~~ in an execution of computer code that includes the particular execution code a execution frequency threshold at which a decreasing hazard rate corresponds to a reciprocal of a break-even number of executions that recoup computational costs of transformation to the optimized form~~.~~; and

means which is encoded in at least one computer-readable media, for dynamically transforming an implementation of the particular execution code, based on the execution frequency threshold determined by the measuring means, to an optimized form thereof;

wherein the hazard rate, *hr(x)*, for a particular one of the computer program portions at least approximates a probability that the particular portion will stop being executed in the computer program given that the particular program has executed *x* times.

EXAMINER'S STATEMENT OF REASONS FOR ALLOWANCE

3. Claims 1-2, 4-21 are allowed.

The following is an examiner's statement of reasons for allowance:

The prior art taken separately or jointly does not suggest or teach the following features.

A method or a computer product having instructions code to (i) compute a execution frequency threshold at which a decreasing hazard rate corresponds to a reciprocal of a break-even number of executions that recoup computational costs of compilation; (ii) wherein the hazard rate for a particular portions of a program code approximates a probability that the particular code portion will stop being executed by the program given that it has executed a *x* times; and dynamically compiling individual ones of the portions of the program based on the execution frequency threshold, to an optimized form thereof, as recited in claims 1, 11 and 15; or

dynamically transforming a particular execution code into a optimized form based the computed execution frequency threshold as recited in claim 21.

Following is teaching relevant to the closest prior art of record:

Chambers, USPN: 6427234, discloses dynamic region execution and reaching a point at which the number of executions exceeds an estimate break-even point at which the dynamic compiling no longer recoups instrumentation costs of static instrumentation, then stop dynamic compiling in favor of static compiling; but does not teach or suggest computing the threshold as in (i) corresponding to the hazard rate as defined in (ii), in order to base upon to dynamically compile into an optimized form.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan A Vu whose telephone number is (272) 272-3735. The examiner can normally be reached on 8AM-4:30PM/Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki can be reached on (571)272-3719.

The fax phone number for the organization where this application or proceeding is assigned is (571) 273-3735 (for non-official correspondence – please consult Examiner before using) or 571-273-8300 (for official correspondence) or redirected to customer service at 571-272-3609.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

VAT
August 18, 2005

KAKALI CHAKI
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